Educational technology adopters: A case study in University of Botswana

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ABSTRACT

Although University of Botswana implemented national ICT policies and trained the lecturers to use educational technology, there was low-level use of eLearning in teaching and learning. In this regard, qualitative case study approach was used to explore and specifically focus on one aspect of the phenomenon; that is, the University of Botswana as a case study and the lecturers as a unit of analysis. The data were collected from artifacts (teaching and learning materials), secondary documents, interviews, and observations. The data analysis was based on the constant comparative method where the data collected was constantly compared to identify codes and themes for accuracy, credibility, and trustworthiness as a means of triangulation and member checks. Findings from the study showed that early adopters experiences in pedagogies, use of technology and delivery of courses is different. The other challenges found was that social system: University of Botswana in which they all operate was constraining them, and educational technology was used in face-to-face (f2f) classroom not in distance education based on compatibility of technology. Practical recommendations are made based on the findings from the study.

Keywords: *challenges; experiences; educational technology; higher education; University of Botswana; adoption and diffusion; early adopters; compatibility of technology, social system*

INTRODUCTION

Technology on education has had and continues to have impact on higher education. The use of educational technology influenced the universities nowadays on offering programs through face-to-face (f2f) to online learning globally. In Africa, generally, technology is being adopted and diffused in education systems to improve accessibility, infrastructure, and implement educational reform. Several studies on the adoption and diffusion of technology innovation in African universities have reported that even if technology infrastructure is in place, accessible, and available, some of the experienced adopters of technology and teaching are not able to use technology in the system (Krishnakumar & Kumar, 2011; Kyakulumbye, Olobo, & Kisenyi, 2013). Farrell and Isaac (2007) concluded that countries in Africa with high ICT use have good infrastructure like Mauritius and South Africa.

Addressing the need for an ICT plan, the Botswana National Maitlamo ICT Policy was initiated and developed in 2005 (Botswana Draft National ICT Policy, 2005) and passed in 2007. The policy was to be used as "a vehicle for change and assist in achieving Vision 2016 and other national development targets" (Botswana Maitlamo National ICT Policy, 2007, p. 4). According to the report of the Botswana National Maitlamo ICT policy of 2007, the Botswana government, through the Ministry of Education, created an initiative through the Thuto-Net program by networking and connecting all schools and tertiary institutions so that all citizens could access equal education through flexible means to satisfy the National Education Policies.

The Maitlamo ICT Policy (2007) outlined the government as a catalyst, stimulator, model user, having a non-technical role to play, and an implementer that encourages, promotes, and initiates

ICT in all sectors of society. This National Maitlamo ICT Policy (2007) established Thuto-Net as a mechanism for connecting schools and universities to the rest of the world through technology. The policy emphasized a need for professional development programs for training teachers and school administrators on the use of ICT in schools. For example, a study conducted by Totolo (2007) investigated the likelihood of computer technology adoption among school principals whom were assumed to be transformational leaders. She identified that time constraints, phobia, a lack of skills or training, and a lack of practice with computers were barriers to the adoption process. Totolo recommended that training on computer use should be included as a strategy. The policy proposed that all schools should have computers and be connected to high-speed internet. The National Maitlamo ICT Policy (2007) principle was to provide easy access to information through computers, which is in line with the long-term plans of Vision 2016 (1997).

In summary, the policies attempted to take the education system of Botswana from an underdeveloped colonial infrastructure to a system of f2f teaching and education for all, and finally to provide education through the internet and computers. This means that the emphasis of the National Commission on Education (1977) and National Policy on Education (1977) was more on the classroom method of teaching as compared to the 1992/93 National Commission Policy on Education, Revised National Policy on Education of 1994, and Vision 2016 of 1997, which focused on the use of technology in the Botswana education system.

The University of Botswana's programs were initially offered face-to-face (f2f) in classrooms. The f2f concept is currently still used at the University of Botswana as was reported in studies by Masalela (2011) and Ntloedibe-Kuswani (2013). But since the aim has been facilitating the accessibility of education to all as stated by the national policies, it has come to a point where eLearning should be used to improve the classroom size and student enrolment (Eyitayo, 2005; Eyitayo & Giannini, 2004). The university policies aimed to get students to use computers and the internet to access materials and lecturers were expected to teach and give feedback in the same manner.

 The university of Botswana initiated e-learning in 2001 (Thurab-Nkhosi, Lee, & Gachago 2005) and was implemented for teaching and learning in 2002 (Thurab-Nkhosi et al. 2005; Gachago, Mafote, Munene-Kabanya, & Lee 2007; Nkhukhu-Orlando 2015; Mutula, 2002). E-learning was implemented based on the Botswana national education policies and reports with the objectives of accessibility of education to all for lifelong learning (distance education). For instance, Thurab-Nkhosi, Lee, and Gachago, (2005) conducted a study at the University of Botswana and found that,

> *... like many academics in institutions of higher education, University of Botswana lecturers are experts in their disciplines but have limited experience with course design and with the use of ICTs in the delivery of courses and programs. For this reason, University of Botswana initiated a system of training through the Department of Educational Technology Unit in the Centre for Academic Development that would build members' capacity for systematic course design and encourage the use of ICTs in the teaching and learning process (However, like many academics, ... para. 2).*

 E-learning at University of Botswana was implemented and lecturers were trained on how to use technology in teaching and learning (Mutula, 2002). Although some lecturers used eLearning tools such as computers, the internet, and Learning Management Systems (LMSs), i.e., Moodle, Blackboard, and WebCT, many were reluctant to use these new avenues. The information and communication technology (ICT) and educational technology adopters (faculty members) encountered challenges in integrating e-learning for adopting and diffusing these technologies for teaching and learning. Similarly, Moakofhi, Leteane, Phiri, Pholelo, and Sebalatlheng (2017) identified challenges that impacts on introduction of eLearning at Botswana University of

Agriculture and Natural Resources. The purpose of this paper is to explore educational technology adopters and integration experiences of technology at the University of Botswana. Although adoption and diffusion of technology integration in higher education has been studied, but little has been done on experiences of technology in Rogers (2003) Diffusion of Innovation (DoI) theoretical context at the University of Botswana. This paper is a summary of five chapters developed from the thesis and focused on answering the following questions:

1. What are the characteristics, knowledge, skills, and beliefs of early technology
   adopters?
2. What are the challenges in the transition process?

The paper is organized into the following sections firstly literature review, secondly describes methodology used to collect and analyze the data, thirdly participants responses to the questions, fourthly the discussions, conclusions, and implications.

LETERATURE REVIEW

Characteristics

According to Rogers (2003) the individual users of technology, social system, and technology characteristics influence the adoption and diffusion of technology in a social system. The social system defines the context in which an individual adopts and diffuses an innovation (Rogers, 1995). Rogers' (2003) Diffusion of Innovation (DoI) theory claims that the adoption and diffusion of an innovation is a process in a social system from a micro to a macro level, which is influenced by the social cultural phenomenon. A social system as defined by Rogers is the humans, organization, and informal groups interacting in the environment to adopt and diffuse an innovation through the social-cultural influence in decision-making. The social system as an organization/institution has structures such as policies, support, rewards, training, and workshops; and this influences early adopters' behaviors, through which they communicate the innovation to other adopters such as late adopters. It is by understanding how the social system based on characteristics influences the behavior of both early and late adopters that we can see how technology is diffused through the system. In this regard, individual users of technology categorized as early adopters' influences the adoption rate of technology use from a social system perspective. It emerged from the literature that early adopters are potential leaders (role models) – influence peers (Giardna, 2010; Sahin, 2006) and agents of potential change (Less, 2003), and are often unique (Jacobsen, 1998) in adopting and diffusing technology innovation in the system. In addition the technological characteristics have an impact on adoption and diffusion of technology and the institution (Buabeng-Adoh, 2012). Literature has shown that innovation attributes: relative advantage, compatibility, complexity, trialability, and observability as perceived by individuals influence the rate of adoption (Rogers, 2003). Rogers argues that, "The perceived attributes of an innovation are one important explanation of the rate of adoption of an innovation" (Rogers, 1995, p. 206). The perceived attributes of an innovation determine the percentage differences on the rate of adoption by an individual or a social unit. An individual or a social unit adopts an innovation if it is perceived as having particular characteristics in line with the needs, beliefs, experiences, values, and knowledge of the individual or unit.

Despite the characteristics of early adopters, technology, and social system as evidenced from the literature, early adopters have been found to be different (Heterophilous) which increases the rate of adoption in the system (Rogers, 2003). The early adopters of technology have different levels of characteristics; others have high level of training, experience, support (Jacobsen, 1998), and gender difference (Buabeng-Adoh, 2012). Early adopters are opinion or social leaders, educated, and are popularly known as important members of a social system who facilitate,

adopt, integrate, and diffuse an innovation after the initial innovators (Rogers, 2003). They are respected in a social system for their well-informed decision-making (Rogers, 1995). It is important to understand early adopters and how their experiences influence or is influenced by the social system's structures, or the attributes of an innovation. Consequently, it becomes important to understand and identify the factors that influence the early adopters' innovation and diffusion of technology to conduct a study for the purpose of identifying and knowing who the participants specific to the study are how and why they adopt the technology in the system.

Knowledge and Skills with Technology

Rogers (2003), views the knowledge stage as the point at which the individual seeks information and processes it in an attempt to determine "what the innovation is and how and why it works" (Rogers, 2003, p. 21). It is at this stage that when the institution provides the right and at the right time knowledge through support, professional development and training, adopters tend to develop skills, awareness, experience and expertise in integration of technology. The knowledge provided to the adopters through support, and training positively impacts on the skills. It means that the adopters' skills in understanding on how to apply the knowledge in integrating technologies is based on the support, and training provided within the social system. Studies have observed that professional development promotes and facilitates the adoption and diffusion of technology innovation (De Gagne & Walters, 2009; Macy, 2007; Samarawickrema & Stacey, 2007). Samarawickrema and Stacey found that participants required different levels of training because they are at different levels of technology adoption in their online courses. The study concluded that training and professional development stimulated academic teachers' interest and their willingness to experiment, boosted their confidence, skills, and led to promoting adoption.

On the other hand, evidence showed that experiences on integration of technology for pedagogies developed through social systems support in technical, leadership, and training, negatively impacts on innovation of technology if it is irrelevant and not compatible. On these bases, early adopters need time to be able to learn to use and practice the technology in teaching and learning. It was revealed in Samarawickrema and Stacey's (2007) study that web-based teaching significantly shapes early adopters' learning time. The time refers to how much allowance the early adopters, in these case lecturers, have to adopt and diffuse technology innovation in the system for teaching and learning. For instance, a lack of time for learning and integrating ICT has been noted in many studies (Samarawickrema & Stacey, 2007). Similarly, a study by Birch and Burnett (2009) found that "individual inhibitors to the development of e-learning formats included lack of time, increased academic workloads and perceived failure by the institution to provide time relief" (p. 124). It is on this basis that the knowledge provided to adopters increases their skills and ability in integration of technology. Literature states, "Therefore, understanding various ways of developing and implementing strategies accordingly in teachers professional development practices will enhance their confidence and help them learn how to deal with aligning technology …" (Kulavuz-Onal, 2018, p.11).

Beliefs in Technology

Rogers (2003) stated that, "compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 15). Hoerup (2001) in Sahin (2006) describes that, teachers' opinions, beliefs, values, and views are influenced by innovations. In terms of diffusion of an innovation, compatible beliefs are fundamental to the process. The compatibility of an innovation is the level at which individual beliefs and experiences are compatible with the new technology. This refers to the beliefs, experiences, values, needs, skills, knowledge, and characteristics of individual technology adopters (Rogers, 2003). If compatibility does not exist the innovation will not be adopted (Samarawickrema & Stacey, 2007). According to Rogers (2003) if the compatibility of an

innovation is high the adoption and diffusion of an innovation is easily adopted at a higher rate. Therefore, it is important for organizations to understand individual adopters' beliefs, experiences and their backgrounds to see the impact on the adoption of the innovation. According to Kulavuz-Onal (2018), "*reports on lived experiences of teachers could give considerable insights*" p.10). This means that experiences determines what technology to use and how to use technology based on knowledge and skills. Otherwise, if an adopter's beliefs and experiences are not compatible to the innovation, it will not be adopted (Jacobsen, 1998, 2000).

Early adopters are experienced users of technology in teaching and learning (Jacobsen, 1998). This experience affects their attitudes. For example, studies have observed that early adopters are technologically more experienced and have more positive attitudes towards technology (Jacobsen, 1998; Laronde, 2010; Samarawickrema & Stacey, 2007; Shea, Pickett, Sua Li, 2005). Researchers revealed that, teachers' experiences, attitudes, and beliefs towards technology influence the successful integration of innovative technology (Jacobsen, 1998; Samarawickrema & Stacey, 2007). Teachers' attitudes towards technology influence their acceptance of the usefulness of the technology and its integration into teaching (Jacobsen, 1998; Samarawickrema and Stacey, 2007). For example, a study by Samarawickrema & Stacey (2007) found that "participants who had a more open attitude to online technologies tended to experiment and be more willing to consider uptake of technology" (p. 327).

Challenges of Technology

Challenges that hinder integration of technology naming the few such as support, professional development and training, top-down approach, infrastructure, and time are generally known. For instance, studies have noted several challenges on implementing e-learning in developing countries (Moakofhi, Leteane, Phiri, Pholele, & Sebalatlheng, 2017). According to Rogers (2003) the adoption and diffusion of technology is a process that takes time and if not taken into consideration, technology will not be adopted. Early adopters need time to be able to learn to use and practice the technology in teaching and learning. It was revealed in Samarawickrema and Stacey's (2007) study that web-based teaching significantly shapes early adopters' learning time. The time refers to how much allowance the early adopters, in these case lecturers, have to adopt and diffuse technology innovation in the system for teaching and learning. For instance, a lack of continuous teacher training and time for learning and integrating ICT has been noted in many studies (Kulavuz-Onal, 2018; Samarawickrema & Stacey, 2007).

Similarly, a study by Birch and Burnett (2009) found that "individual inhibitors to the development of e-learning formats included lack of time, increased academic workloads and perceived failure by the institution to provide time relief" (p. 124). In addition, for example, in the study conducted by Samarawickrema and Stacey the participants commented that there were no clear policies to guide them, and this led to tensions and conflicts. Furthermore, "participants could not identify university- or faculty-level policies that addressed key concerns such as career paths, work guidelines, and workloads, which impacted on their responses related to technology adoption by the teaching academics" (p. 329). Although early adopters are experienced in teaching and in the use of some technology, studies have noted that there are those who resist being early adopters because they do not want to change the teaching methods, preferring to use the same traditional modes of f2f to online teaching (Jacobsen, 1998). Laronde (2010) found that professors who were using computers said the internet was unreliable and too slow to be used in class. Many also commented that they would not be able to move around in a classroom with 40 B.Ed. students using laptops plugged into electrical outlets.

According to Farrell and Isaac (2007), countries in Africa are different from each other in the application and implementation of ICT policies and infrastructure for education. They claim that South Africa is able to move its ICT agenda forward, similar to the way in which countries of North

Africa that have resources and high bandwidth connectivity to Europe have been able to. Ghana, Mauritius, and Botswana were also identified as countries moving steadily forward and making remarkable progress in ICT. Farrell and Isaac also mentioned another group of African countries, which are consistently facing conflict and economic instability, such as Malawi, Rwanda, Somalia, Senegal, Algeria, and Nigeria. These countries need more assistance with ICT. The main hindrances that have been identified as facing African education systems are a lack of infrastructure, a lack of accessibility, a lack of networking, high telephone and internet costs, limited expertise and skills and a lack of enabling national policies (Adeya, 2001; Farrell & Isaacs, 2007; Farrell, Isaacs, & Trucano, 2007; Ojuloge & Awoleye, 2012; Schachter, Pence, Zuckernick, & Roberts, 2005).

Several studies on the adoption and diffusion of technology innovation in African universities have reported that even if technology infrastructure is in place, accessible, and available, some of the experienced adopters of technology and teaching are not able to use technology in the system (Krishnakumar & Kumar, 2011; Kyakulumbye, Olobo, & Kisenyi, 2013). Farrell and Isaacs (2007), as cited in Twinomujuni (2011), reported that although all of the faculty members of the Makerere University were trained and supported by the Faculty of Computing and Information Technology in e-learning technologies, only few teachers had the skills to make pedagogical use of ICTs. The reason "could be due to inadequate ICT training skills, lack of time and negative attitude by teachers towards ICT implementation" (p. 19). Twinomununi (2011) recommended in his study that:

> To overcome the problem of poor and lack of skills in ICT, institutions of higher learning could be encouraged to employ a variety of teacher training methods, ranging from face-to-face workshops to online self-study programs depending on training objectives and environments (p. 91).

In the context of Africa, at times users or adopters of technology, even when they are aware of the potential benefits, are not ready or are unwilling to fully embrace the ICT (Obiri-Jeboah, Kwarteng, & Kyere-Djan, 2013). As mentioned, it was observed that some adopters of technology innovation in universities are technophobic. They had fear of using technology for teaching and learning, lack knowledge and skills, and were not aware of technology policies; thus far, university policymakers and administrators initiated and introduced the new technologies without involving them. Some technology adopters in universities such as lecturers' tend to use technology in teaching when they have been exposed to it in advance through training or workshops, and had used it before. Lecturers in the African university context prefer to use technology that is compatible to their teaching experiences. In the United Kingdom, North America, and Australia, academic teachers are keen to apply their teaching and learning experiences in web-based learning, whereas in the context of Africa, academic teachers find it difficult to apply teaching experiences using technology.

METHODOLOGY

This section outlines the methodological processes undertaken by the researcher. The purpose of my study was to explore in-depth experiences with technology among the lecturers who are early adopters of technology. In this case, my study includes the relevant experiences, values, and context as part of the investigation (Lekoko, 2002). The study uses qualitative case study approach. A case study is known to be a qualitative method that emphasizes the collection of in-depth information (Merriam, 2009; Savin-Baden & Major, 2013; Stake, 2010). In this research, the University of Botswana is the case study, to equate Rogers's term social system, and individual lecturers were the unit of analysis. Therefore, a case study facilitates the exploration of a phenomenon such as the experiences of technology among early adopters within its context

(Baxter & Jack, 2008). Within these boundaries, the intention was to be exploratory.

A case study is an analysis of a single phenomenon or a social unit for an intensive and holistic description as noted above (Creswell, 2012; Merriam, 2009; Stake, 2005; Yin, 2014). Researchers have observed that case study research allows the in-depth study or examination of extensive amounts of information about a few units or cases over specified periods of time (Creswell, 2012; Merriam, 2014; Savin-Baden & Major, 2013; Stake, 1994; Yin, 2014). Therefore, qualitative case studies are about context-dependent knowledge and the experiences of the selected participants, with expertise in the area of study specific to the context (Merriam, 2009; Yin, 2003). The study site and participants were purposively selected and conducted at the University of Botswana with lecturers who are engaged in the transition process.

Sample Selection of the Participants and Site

Purposeful sampling is a strategy in which particular settings, persons, or events are selected deliberately in order to provide information pertinent to the purpose and phenomenon of interest (Creswell, 2012; Merriam, 2009). I purposely selected the nine participants from the lecturers in the Department of Adult Education out of the total twenty. These lecturers were specifically those involved in f2f and distance education when delivering courses at the University of Botswana. The eleven participants were excluded because they were not involved in the transition process from f2f to distance with an intention to online learning.

The research site is a specific place where the study was conducted. The site gives meaning to the study (Savin-Baden & Major, 2013). A site can be multiple, visual, or single. In this study, the site was the University of Botswana. The University of Botswana has various faculties with departments. Furthermore, there are other university departments and programs such as the Center for Continuing Education, a program for the disabled, a library, the National Institute of Development Research and Documentation, a legal clinic, the Okavango Research Center, and the Counseling Center. Specific to this study, I initially selected two faculties, Education and Business, with their specific programs and departments. For example, Adult Education and four Business programs were selected because they offered courses through both the f2f to distance education mode using print and online media. I later excluded the Business programs because of possible conflict of interest issues. Although two of the faculties and departments deliver programs through f2f and distance, I purposely selected the Faculty of Education's Department of Adult Education.

The purposeful sampling procedure I used above was in line with the research literature. I selected participants who were suitable for this study (Patton, 2005). Patton (2002) argues that the researcher must select participants one can learn more from, like those with rich information, as in my case study. I applied a criterion and convenient strategies by purposively selecting the participants (Lekoko, 2002). The criterion I applied as noted above was selecting only participants who teach f2f to distance education.

The University of Botswana was used as a case study to explore experiences of early technology adopters in the transition process from f2f to distance education to online, using print and online media. This data is important for gaining an understanding of how these early adopters experienced technology. Although all the participants taught f2f to distance education, they did not all teach the same courses in these modes. For example, one participant taught in the Department of Adult Education (XYZ) 706 f2f and (XYZ) 707 by distance. The focus of this paper is to explain how the participants taught and what technologies they used.

Data collection Methods and Procedures

In this section, the discussion focuses on the specific methods and procedures used for collecting the data for this study. Scholars of case study research emphasize that the methods used to collect data must be based on the specific research design (Creswell, 2009; Lincoln & Guba, 1985; Merriam, 1998; Stake, 1995; Yin, 2014). The methods used for data collection are based on the purpose, discipline, and approach of the study. From a qualitative case studies approach generally data is collected from a variety of sources such as interviews, artifacts/secondary documents, and observations.

It was with this understanding that I used four qualitative case study data collection methods to collect data: artifacts, secondary documents, interviews, and observations. Data collection was divided into two phases (see Figure 1). The purpose of Phase 1 was to facilitate my interview guide and observation tools. In Phase 1, I collected artifacts from the participants; that is, teaching and learning materials, as evidence of what and how they had been teaching and secondary documents such as policies, reports, statistical records, from the University of Botswana, Ministry of Education, Human Resource Development Council previously called Tertiary Education Council, and Southern African Development Community, relating to how they informed or impacted the transition process in Botswana's higher education system . According to Savin-Baden and Major (2013), "secondary documents provide rich and readily available sources to the researcher to understand the participants' perspectives and context" (p. 403). I read the documents and extracted relevant information to modify the interview guide.   Phase 1 set the stage as a road map for Phase 2 which consisted of interviews and observations, where I conducted face-to-face (f2f) in-depth individual interviews with purposively selected lecturers. I was able to modify, in Phase 2, my interview guide questions, and in this regard, I developed the observation tools. These two types of documents enabled me to understand the experiences of lecturers using technology at the University of Botswana and also to triangulate the data with interview transcripts and observations.
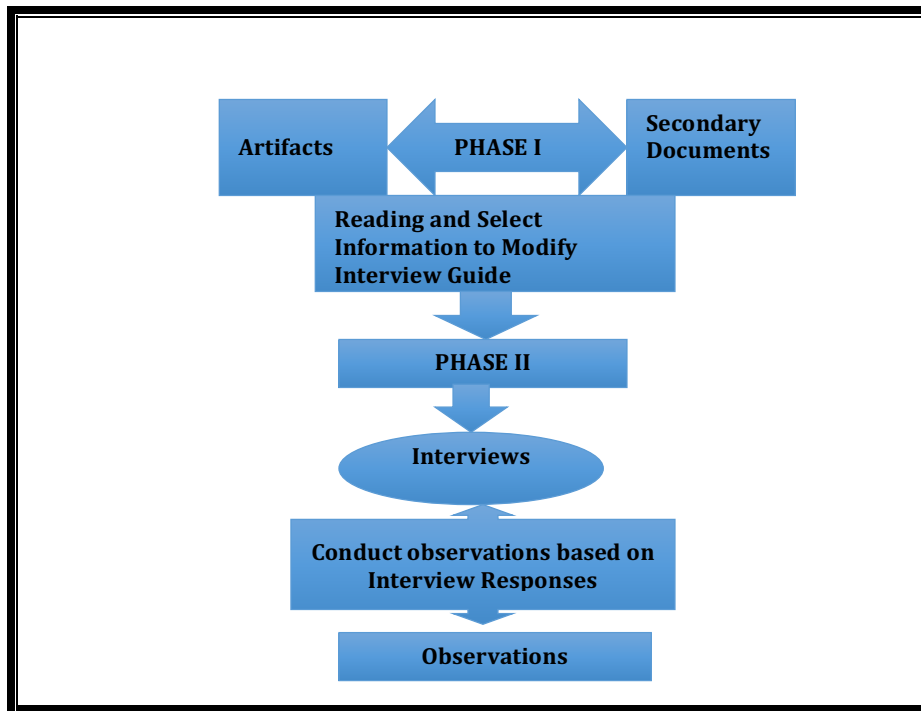
Figure 1: *Qualitative Data Collection Methods*

According to Savin-Baden and Major (2013) "Interviews are the most common method of gathering data for qualitative research" (p. 357), which is similar to Creswell's (2009) views. Interviews are defined as a specialized pattern of interaction, for a specific purpose, and focus on specific content (Creswell, 2009; Merriam, 2002; Stake, 2005; Yin, 2014).   Qualitative interviewing is a process through which rich, holistic, in-depth data is collected. The qualitative case-study researcher can choose to conduct the interviews on a one-to-one basis or through a focus group (Merriam, 2009; Stake, 2005; Yin, 2014). I chose individual interviews to access this in-depth nature of the data. In my study the individual interviews were tape-recorded, with each session lasting 40 to 60 minutes, and were rich, holistic, and in-depth. Qualitative case study interviewing is in line with the interpretative and social constructivist perspective (Sibande, 2011), which is in-line with my overall research design. Using a semi-structured type in this study allowed participants to freely express themselves in a natural setting. Semi-structured questions tend to be open-ended to obtain in-depth information and allowing participants to express their perspectives freely (Merriam, 2001). Some questions are set in advance and can be modified in the process of interviewing based on the responses from interviewees (Creswell, 2012; Merriam, 1998).   It was important to be observant during f2f interviews in order to collect relevant data and I also found it helpful to take notes in this process (Lincoln & Guba, 1985).

According to Marshall and Rossman (2014), "observation entails the systematic noting and recording of events, behaviors, and artifacts (objects) in the social setting chosen for study" (p. 98). Based on this definition, an observation is an ongoing dynamic process in nature because it enables the researcher to understand how the participants react when involved in their real work. I wanted to see a bigger picture by observing participants in the f2f classroom. Using information from interview process, I selected what to observe. These two different methods enabled me to explore their experiences of technology in the transition process.

I was interested in finding out if what I observed matched the lecturers' responses during the interviews. This enabled me to get answers on how they taught with technology and how they were influenced by their experiences in the transition process. I was able to strengthen my study, and also examine non-verbal expressions. The other questions that elicited answers from the observations were: who they interacted with, how they interacted, why, and how much time they spent on various activities? In the interview these answers were given through self-reporting, but my in-class observations allowed me to verify self-reports (Savin-Baden & Major, 2013).

Table 1: *A Sample showing the Process of How Data is Triangulated*

Artifacts	Secondary Documents	Observations	Triangulated Data
→	→	→	→
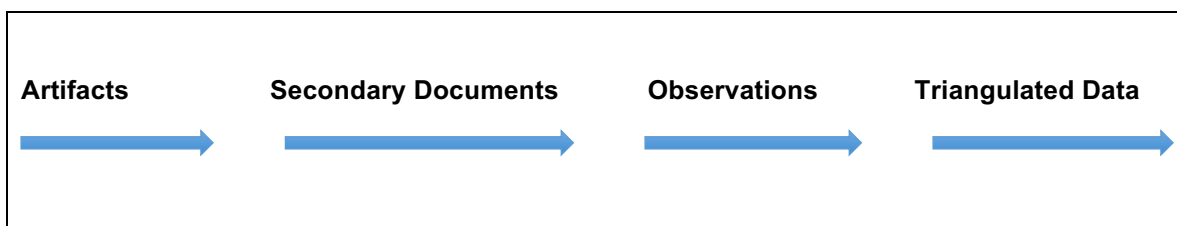
Observation enables the researcher to understand how individuals socially construct realities (Merriam, 2002; Sibande, 2011; Stake, 2005; Yin, 2014). In a qualitative case study, the researcher can use pre-written questions to guide the observation process as I did in my case

study. Observation enabled me to see aspects of the surrounding environment such as people, events, materials, and documents. The physical reactions by the participants were also observed. Observations were made in f2f classroom and I took notes on the actual teaching. For example, I observed the early adopters at the University of Botswana delivering f2f and distance education courses during residential sessions.

In summary, a combination of semi-structured interview instruments, the examination of artifacts, review of secondary documents, and observation notes were used in the qualitative research for triangulation (Patton, 2002), shown in Table 1 as an example. The combination of using three or four techniques for gathering and analyzing the data was for cross-data validity checks (Yin, 2014). Triangulation, as one of the cross-data validity checks, promotes the verification and validation of qualitative data and also the validation of sources, ensuring the consistency of data from different sources (Creswell, 2009; Merriam, 2002; Patton, 2002). The interviews as instruments were compared with official documents such as secondary documents and artifacts for further validation as shown in Table 1.

Recording and Data Analysis

Since my study was a qualitative case study, I preferred to take notes from the artifacts and secondary documents, which I collected. I also audio recorded the participants' voices during the interviews, and took notes during the observation process. According to Patton (1990) tape recording is important, whereas Lincoln and Guba (1985) argue that tape recording should not be recommended, and should only be used for unusual reasons, with note taking been preferable. Their main reason was because technical recording devices can fail and/or interfere with other networks (Lekoko, 2002). I tape-recorded all interviews and I was taking notes continuously before, during, and after data collection to ensure I captured all the data.

The interview transcripts were transcribed into text (Creswell, 2012; Merriam, 2002; Patton, 2002). I transcribed data verbatim. Once the process of transcribing was completed, the typed information was organized and analyzed. Data analysis, according to Bogdan and Biklen (1992), as cited in Lekoko (2002) is "working with data, organizing it, breaking it into manageable units, synthesizing it, searching for patterns, discovering what is important and what is to be learned" (p. 145). The data analysis for my study focused on exploring how the experiences of technology of each individual University of Botswana academic teaching staff member influences or is influenced by the transition from classroom to distance education using media that is print and online. The experiences and transition processes were both qualitative in nature; therefore, I took an interpretative stance for rich description and insights (Lekoko, 2002).

I analyzed my data before, during, and after collecting data. Bogdan and Biklen (2012) argue that data analysis begins when the researcher explores the literature before and during data collection. The process of continuously analyzing the data enabled me to formulate a deeper understanding of the phenomenon of how experiences with technology influenced the transition process (Bogdan & Beklin, 1992; Creswell, 2012; Merriam, 2002; Yin, 2014). The simultaneous process of collecting and analyzing data is a qualitative approach as noted by Marshall and Rossman (2014) and Creswell (2009). I continuously worked with data before and after collecting, organizing it back and forth, breaking it into manageable parts, synthesizing it, searching for patterns, and discovering important things to be learned to inform my study (Bogdan & Biklen, 2012; Merriam, 2009; Yin, 2014; Figure 2).

Figure 2: *Data Analysis Process*

Source: This is based on my study's analysis and on the views of Merriam, 2009; Creswell, 2012; Yin 2014; Bogdan & Biklen, 2012; LeCompte, 2000; Corbin & Strauss, 2008; Marshall & Rossman 2014; Maxwell, 2012; Charmaz, 2000, 2008).

I chose the constant comparative method for my data analysis (Lekoko, 2002; Ntseane, 1999; Sibande, 2011). A qualitative constant comparative method was the best data analysis method to use to constantly compare the data for trustworthy results (see Figure 2). The constant comparative method served the purpose because my data was in the form of text, transcribed verbatim in notes and observations. My main aim was to examine the artifacts, secondary documents, transcribed interviews, and observations, along with the additional notes, memos and materials collected, and to determine the coding, categorizing, and themes that emerged. It was a major challenge to make sense of the huge amount of data collected, reduce the volume of information, identify patterns and keywords, and construct a framework to communicate the results. This is similar to the views in the literature (Patton 1990).

The process through which I analyzed the transcribed interviews and extracted hundreds of keywords, identifying categories and themes is in line with qualitative data analysis process. I compared the data back and forth by reading/re-reading the transcribed data and listening/re-listening to the actual interviews to obtain a thick description (see Figure 2). According to Denzin (1989), Geertz (1973), and Ponterotto (2006), thick description is a way of writing that includes describing the human voices, feelings, actions, and meanings in context as stated in Figure 2. It was through this process of rigorous data analysis that the results are described in the following section.

RESULTS AND DISCUSSIONS

The purpose of this section is to discuss participants' perceptions about moving to online learning and to analyze participants' responses to the research questions to further enable an understanding of the transition process. Two research questions were developed based on the primary question. Responses from participants were coded in line with three of Rogers' (2003) concepts (compatibility of technology, social systems, and early adopters), focusing on the use of

technology innovation in the transition process. The first question was "what are the characteristics, knowledge, skills, and beliefs of early technology adopters?" Participants described themselves and their teaching at the University of Botswana (compiled in the participant profiles) as well as their thoughts about what was needed for the implementation of online learning. The second question was "what are the challenges in the transition process?" These questions allowed participants to share their knowledge and thoughts, and give comments, suggestions, or recommendations on their experiences of technology in the transition process. From these general responses the emotions of the participants was identified as a key theme. This chapter is structured by using the two questions to organize participant responses, followed by a discussion of participant emotions.

What are the Characteristics, Knowledge, Skills, and Beliefs of Early Technology Adopters

This section reporting who the participants are, examines the characteristics, knowledge, skills and beliefs separately. Drawing on Rogers (2003) Diffusion of Innovation (DoI) theory, and participants' responses will be contextualized within this diffusion of technology theory.

Characteristics

In this section, Rogers' (2003) views on the characteristics of early adopters were used to understand who and how participants are related to technology. Four aspects of Roger's characteristics were found: innovativeness, localites or interpersonal networks, leadership roles, and the concept of change agents. Each of these will be discussed below.

Innovativeness: According to Rogers, "Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system" (p. 22). Adopters are classified into two groups of early adopters: 1) innovators and early adopters and 2) three groups of late adopters: early majority, late majority, and laggards. The participants in this study were categorized as early adopters in adopting and diffusing innovative technology because of their innovativeness at the University of Botswana. I selected them because of their involvement in online learning technologies. However, it soon became clear that 'early adopter' means something very different in this context.

In a context like Botswana where there is little technology in the everyday lives of people (little email, few laptop computers, limited if any, online courses), the role and characteristics of early adopters is different to that of the North American context where technology is saturated in the environment and widely used. For participants' in this study, faced with these major obstacles, deciding to learn a Learning Management Systems, for example, is innovation. Participants reported that they attended training offered to them on how and why to use technology in teaching and learning. This showed that they were early adopters because the expectation was for them to migrate to online learning. Generally, participants used some online technologies in teaching and learning even though they felt they were not given enough time to learn and practice using it. Generally, the participants felt that the university in transitioning to online technologies did not support them, but they still went out of their way to use technologies and to apply the knowledge and skills they received through the Centre for Academic Development on how to use these technologies. According to Rogers, the innovativeness of early adopters increases the rate of technology innovation adoption and diffusion in the system. As it is in this study, the participants who used technology before such as Oratile, Lorato, and Mpho had a higher degree of innovativeness than those who started more recently like Serero, and Mmapula. For example, Lorato commented:

I love the new technology. I am one of the first lecturers here who tried using Learning Management Systems such as WebCT and Blackboard. I tried to use Facebook also with the face-to-face (f2F) students last academic year and I loved it. The reason why I halted was because that is my line of study really. I wanted to access, evaluate, and see what it is that makes the students not to go into the online course the way they should. It is my line of study because it worries me that we have this technology, which I was excited about and thought the students also will be excited about but it seems they were not.

Mmapula said: "Although the f2f teaching schedules and personal weekend times clash with the training sessions offered through Centre for Academic Development for lecturers, I tried to create time and attend some of the sessions".

However, some participants', like Serero and Mmapula, did not enjoy using online technologies, like Learning Management Systems, in teaching but still used cellphones as a way of contacting students and contacted peers for assistance which again shows some level of innovation. Serero said: "I felt for distance education learners and I contacted them through telephone, SMS [text messages] to check if they needed assistance and asked Keitumtse to show me how to use some tools from the Blackboard".

The participant responses show that although the innovations and use of online technology was small, they were innovative within the constraining circumstances they found themselves in. They did participate in the diffusion of technology in the system, even though it was to a small extent. For example, Lorato was the first lecturer to use a Learning Management System and to help others with this technology. She also evaluated, on her own, to find out why f2f students were not accessing materials posted online. In addition, although she had never been trained to use Facebook in teaching and learning, Lorato did use this online technology. Similarly, Keitumetse acquainted himself with these technologies by attending many training workshops offered by the Centre for Academic Development despite a heavy teaching load. While this may not seem like innovation, within this context, showing an interest and attending training constitutes adopter characteristics. While the extent of innovation may not equate to the interpretations of Rogers in other contexts, within this constraining context, the participants still showed a level of innovativeness. Learning how to use a Learning Management System or contacting students via cell phone is evidence of overcoming inertia and being actively agentive in a context where technology is foreign and unknown. These examples all show adopter characteristics and an underlying belief in the value of online technology and that is what makes them innovators.

Localites – Interpersonal Networks: According to Rogers (1995), early adopters are characterized as localites, as opposed to cosmopolites. Cosmopolites communicate through mass media but localites communicate locally within a social system through interpersonal communication channels. Localites communicate with peers, are role models, and opinion leaders who advise potential adopters about innovation. They are also respected by peers and can make intelligent decisions on the adoption and diffusion of technology (Rogers, 1995). Rogers argues that, "Early adopters are a more integrated part of the local social system than are innovators …" (p. 283). In other words, early adopters are more influential at the local level within the social system. Localites are influential at the local level by communicating through interpersonal networks on the same level with other peers. This characteristic is true for participants in this study. Participants shared experiences and helped each other at the peer local level. Those with more experience using online technologies helped others and shared resources, thus helping to diffuse the technology. For instance, Mmapula said that she is of the old school but she values and knows that technology is valuable for teaching and learning and commented that:

> *I have limited time to attend the workshops offered to us by the Center for Academic Development on how to use Learning Management Systems in teaching. I find it hard to follow because they are very fast when explaining and I am not used to using computer most often for teaching. So, after these workshops, I ask for help from other lecturers with more experience. I asked Keitumetse how I can use for instance the discussion chat with my students, one of the Blackboard tools.*

Lorato being more experienced in use of technology advised his peers on how to post materials online and check if student had accessed them, she said to Serero when she came for help:

> *First you access the Blackboard, but make sure you have the names and emails of all your students because you are going to add that information in the system: Blackboard. Then you must also have the materials you want to send to them prepared well and clear in advance because you are going to add all the materials you want them to have before they come for class. Once you have added all this information, then this is where you add each type of information because Blackboard has different section/sides for each type of information …*

Leadership Roles: Rogers (2003) argues that when early adopters are role models their attitude toward innovation is highly important. He said that, "early adopters put their stamp of the approval on a new idea by adopting it" (p. 283). In this way, early adopters play a leadership role in aiding the diffusion of technology. Many of the participants in this study were role models with their positive attitudes toward technology innovation. Again here, the amount of leadership is small, given the lack of technology use overall. However, many participants for instance Kutlo, Oratile, and Lorato posted the materials online for students to access before they attend the f2f class. These lecturers were enthusiastic about using WebCT, Moodle or Blackboard and shared this enthusiasm with others at the university. Even within the sample group, participants encouraged and stimulated others. Rogers (1995) said that early adopters are confident and efficacious risk takers with technology innovation. He further said that they are:

> *… the 'heart of the diffusion process' which consists of interpersonal network exchanges and social modeling between those individuals who have already adopted an innovation and those who are then influenced to do so. Diffusion is fundamentally a social process (p. 34).*

This social process was evident among participants and several participants could be described as "confident and efficacious risk takers". Obviously not all the participants can be described as such, for example, Serero and Mmapula, but on the whole, in this context of such little technology use, these participants stood out as leaders. For instance, Serero commented: "Please feel free to contact me through telephone or cellphone or text messaging, I am here to assist you in whatever problem you have and wherever you are, please." Overall, participants were opinion-leaders, which helped, in a small way, to diffuse the technology through the system. On the other hand, Mmapula commented, "I advised the students to use the technology by assessing materials sent to them online and learn from the internet to get a broader better understanding of concepts". The early adopters in this study were not performing this role without constraints. The diffusion process generally was constrained by the university administration and the context of poor infrastructure.

From Rogers' perspective, early adopters hold leadership roles and act as leaders and others come to them for advice for information about innovation. Roger's argues that true innovators play a central role in every stage of the innovation process, from the initiation to the implementation stage. In this study, however, participants felt they were not involved in the initiation stages and also that their leadership role was not recognized in the system. They were

only involved in the implementation stage where they could not influence some of the decisions that had already been made. These points surfaced many times throughout the study.

Change Agents: Rogers (1995) argued that a change agent is an individual who influences potential adopters in a direction that requires substantial change. Therefore, early adopters as opinion leaders make changes as "local evangelists", (Jacobsen, 1998, p.18) and "missionaries" (Rogers 1962, p. 249) to speed up the diffusion process. Again, while the participants in this study may not be change agents on the level of those in technology rich contexts, some tended to act as change agents. Change agents tend to lead the diffusion process by influencing others, especially potential late adopters. For example, Lorato's act of exploring why students were not using materials posted online was done to help other lecturers and to encourage more use of online technologies. Serero and Mmapula, the two participants who had the least amount of innovation where technology was concerned still contacted others like Keitumetse to learn and practice use of technology.

In addition, all lecturers posted materials online in their f2f classes as a way of influencing students to access and use online materials. Although Rogers views the organization as the main change agent, he also expects the early adopters to influence late adopters by being change agents. The broader literature concurs with the fact that a change agent is any individual who influences and makes changes in the organization (Ellsworth, 2000; Hall and Hord, 2014). In this study, participants felt they were expected to make changes through technology, which they did at a local level, but they could not act as "missionary" change agents (Rogers 1962, p. 249) because they felt that the university environment had too many obstacles to the diffusion of online technologies. Their influence as change agents was relatively small as a result. The university did not allow them time to really learn and or to practice using this technology, enough to be effective change agents within the system.

Knowledge of Technology

The participants in this study were made aware of the technology innovation used by the University of Botswana because they were offered free professional development and training through the Centre for Academic Development on the current eLearning technologies. These changed over time from WebCT to Blackboard to Moodle. Sometimes these Learning Management Systems existed concurrently. Training focused on the components of the Learning Management Systems and how they could be used in teaching adult education courses and programs. Additional training was offered on using social media (Facebook, the internet, etc.) in teaching as well as using PowerPoint for in-class as well as conference presentations. Participants generally showed awareness of awareness-knowledge, how-to-knowledge, and principles-knowledge. They all took part in regular professional development and training offered to them by the university. Some gained knowledge from peers, by attending seminars, conferences, and workshops outside of the training offered. These lecturers were aware of how to use the technologies as well as the policies laid down by the system in which they operated. Learning from peers, and other sources, is an indication of a willingness to understand and use technology outside professional development provided by the system. One participant, Lorato had reported that they often used their private time to gain further knowledge about the innovation. For some of them this was seen as an infringement of personal time. Even professional development was often conducted during personal time. Seminars, workshops and training often took place during university holidays and weekends.

Therefore, it is fair to say that the participants in this study had adequate knowledge of the technologies being diffused. This knowledge was not equal among participants. Not all

participants had enough knowledge they felt, to teach the adult education courses using online technologies. Although technology was used in face-to-face classes and in distance education residential classes, some claimed that they did not have enough knowledge on how to teach distance education at the University of Botswana via online technologies. The participants generally said that online learning was not easy for them. The participants said they needed more knowledge on the use of technology in pedagogies because f2f students and distance education learners did not access online materials. Lesego's comment below indicates the extent of her knowledge but also the gaps:

> *We as lecturers are trained abroad, so I have everything in my computer that I need to use. But the thing is there is no lab for distance education learners or where they are they don't have access to the computer, even if I wanted to send them something through the internet (online through the web), and if I wanted to interact with them, I can't do it.*

The participants' knowledge varied, some were content experts in the field of adult education teaching or in their area of specialization, but not all were experienced and knowledgeable in technology. Although some had been sent abroad for training and most received training through short-term courses at the University of Botswana on how to use technology for teaching and learning, they certainly were not experts in all areas of technology, teaching, and content.

As Lesego noted:

> *We need people who have the know-how and experience in distance education and also who are capable to deliver online because they know what to do, they know how to handle students and I am saying because with my experience and my training is not sufficient. So the University of Botswana is still very far, meaning still behind on online learning.*

In line with Rogers' (1995, 2003) views, and the results found in this study, Seeman (2003), cited in Sahin (2006), argues that, "To create new knowledge, technology education and practice should provide not only a how-to experience but also know why experience. In fact, an individual may have all the necessary knowledge, but this does not mean that the individual will adopt the innovation because the individuals' attitudes' also shapes the adoption or rejection of the innovation" (p. 16). Similarly, Hassinger (1959), cited in Jacobsen (1998), "argues that even if individuals are exposed to innovation messages, such exposure will have little effect unless the innovation perceived was relevant to the individual's needs and as consistent with the individual's attitudes and beliefs" (p. 14). Although this is true, in the case of this study, participants felt that the innovation was relevant to their individual needs attitudes and beliefs but that constraints within the system hampered whatever knowledge they did have and this is why diffusion of online technologies was so slow.

Skills with Technology

Understanding and knowledge does not necessarily mean that they possessed the necessary skills to engage with the technology at a systematic level. Since online media changes frequently, participants needed ongoing training on Learning Management Systems and online media to enhance their skills. In addition, they were not using these technologies on a regular basis and this hampered skills development. Participants believed that they acquired the necessary skills through the training provided by the university, but they found that using these skills to really engage with the technology was a challenge to them.

This shows that although the lecturers had knowledge and skills in using technology, transferring that knowledge and skills to teaching and learning in a classroom was an obstacle for them, particularly when transitioning from f2f to distance education where they were expected to teach online. It is not surprising then that as Mmapula said, it was easier to use online technologies in the f2f classroom. However, Lesego, with a PhD in adult education had experience in use of technology and more skills, was more innovative in changing her teaching approach by incorporating more online media. In other words, the more skills a participant had acquired, the more likely they were to be innovative with the technology.

Lesego highlighted the necessity of skills when she said:

> *We can do distance education through print as we had been doing and also through f2f as is the custom at the University of Botswana, but I am saying it is time to go fully online. Unfortunately we cannot due to two problems: resources, so that people can access online technology, and the capacity. Just because you have been trained as a teacher does not mean you will be a good online facilitator, and that is the issue of resources.*

Participant responses have shown that one might possess knowledge but lack the skills to transfer that knowledge into practice. The data shows that it was relatively easy to train lecturers on how to use a Learning Management System (skills) and that although they could use the Learning Management Systems (abilities), they often lacked the deep understanding of that technology that is achieved when someone is immersed in technology both personally and professionally. This lack of deep knowledge slows down the diffusion process.

Beliefs in Technology in face-to-face classrooms

The responses from participants on their beliefs about the value of online technologies were varied. Five participants said that online technology was beneficial, and some (three) said while beneficial, it was not possible at the University of Botswana, while one participant Mmapula, said she was not sure if technology adoption was beneficial to teaching and learning. These contradictory arguments from participants resonate with Surry's (1997) views. According to Surry, there are those who believe that technology changes human behavior in positive ways and others that believe that technology is inherently evil. Although their views differ, they all believe that technology is a superior force and ultimately directs and determines change in an institution. This is a deterministic view. Opposed to determinists are instrumentalist theorists, who resonate with Rogers' (2003) views on the adoption and diffusion process of technology innovation. Instrumentalists believe that social conditions and human desires are the means for change and not technology itself (Surry & Farquhar, 1997). Technology, here, is seen as a gradual evolutionary process that is slow to be adopted, implemented, and used by potential adopters in the social system.

Therefore, in favor of an instrumentalist view, most participants believed there was a need to provide technology for students to study online. They also believed that technology on its own had value. This is why all participants used various online media even if their views were determinist or instrumentalist and why they are still described as early adopters. Even if the participant's view of technology was negative, they felt that technology was a superior force that determined change. In the sections below, participant's beliefs have been grouped around themes.

Technology in Face-to-Face Teaching: Many participants used online media in teaching such as Learning Management Systems, Web 2.0, social media, and other technologies such as

computer software (mostly PowerPoint) and cellphones (especially text messaging). Some classrooms were also equipped with SMART Boards. While most believed the value of technology in the classroom, Learning Management Systems were the least used. Most often, lecturers used Blackboard, for example, to post materials. They also minimally used discussion forums. But many other functions on Blackboard were not used. Some used the internet to access YouTube videos or relevant websites while teaching f2f classes. Others had Facebook pages for their classes.

Participants reported that when online media such as Blackboard was used it was often impossible to use properly or it was used in a way that did not serve the purpose it was meant to. Participants recognized the value of online technology in f2f teaching as a productive means to facilitate f2f teaching while at the same time they believed that it was not possible to currently use the technology properly. Participants believed that if online technology could be used successfully it would facilitate f2f teaching. All the participants mentioned that when they used a Learning Management System in f2f classes, they struggled with student uptake. They would post materials but students would not access the materials. Participants assumed that if students accessed the materials online, it would help students prepare for class and it would reduce their own teaching workload. The assumption was that when students attend f2f classroom sessions, the lecturer need not repeat what was posted online with great emphasis and the students' interaction rate would be high. Other views were that there was no need to print what was posted online and to distribute it again in class as handouts. Therefore, lecturers believed that online Learning Management Systems like Blackboard were valuable if used by learners and if lecturers were more fully supported to use them. There was a comment from Lesego that: "University of Botswana should be slowly moving towards online programs, as this is an international approach". The view by Lesego concurs with other participants' opinions that online learning is important. In the end, all participants ended up providing printed handouts in class. Participants were disappointed by the seemingly lack of interest in technology by students.

In the absence of other technology-use, lecturers most often used PowerPoint slide presentations because it was compatible with their current needs, which was to complete the syllabus and provide students with clear and printable content. This tension of wanting to use online technologies and feeling unable to was clearly communicated by participants. All participants perceived online learning as important. Here is another comment from Lesego: … why should I be in front of those kids in a f2f classroom when online media is there and the resources are available, I could do it online. ….

A clear theme that emerged from participants was the perspective that although online technologies were available it was not possible to use them. Kutlo said: "I posted the material through Blackboard and students still are not prepared for the lesson and come to class without a handout". During my observations I found that a few f2f students brought their own laptops to the classroom yet they did not access the PowerPoint slides that were posted online through Blackboard by the lecturer. Participants felt that students were aware that handouts would be provided in class and this was the reason for students not accessing the online materials. It is possible to speculate other reasons. Many students cannot afford the cost of printing out the online materials so they prefer the lecturer to print these out. Many students do not know how to use the online Learning Management Systems even though computers and training are available. In addition, based on observations, during f2f classroom sessions Oratile could not use the SMART Board when teaching f2f graduate students because of electricity cutouts. The lack of infrastructure and resources could be why students do not access materials.

Briefly, participants believed that online media is possible at the University of Botswana if the lecturers are fully supported by the system and if students use it. The participants' views concur

with Rogers' (2003) idea that even though technology is diffused in the system by early adopters it does not guarantee that the end users such as f2f students, will use it.

Value of Technology in Distance Education

Several themes emerged in relation to beliefs about the value of technology in distance education. *Lack of Infrastructure:* Distance education, at the University of Botswana, started with a correspondence delivery program using print, TV, and radio. From 2001, when the University of Botswana introduced online learning technologies, distance education became blended whereby students came onto campus at the beginning of semester to collect printed modules and to receive instruction on how to use the modules. Learners were expected to return to their usually remote places of residence and work independently using the modules. At the end of the semester, learners returned to the University of Botswana to complete a one-week residency, revision of the modules and exams. Over time, the idea was that the print modules would be replaced by online courses that students could access from their remote regions. Ultimately, the purpose was to teach fully online. However, participants at the University of Botswana found that although the latest online media and other technologies were available, distance education learners were not able to use online media. A most basic problem was that distance education learners could not connect to the internet as most of them were in remote rural areas and internet connections are rare. Participants, instead, used technologies and telecommunications media that were compatible to their conditions to contact and inform students such as cellphones and landline-telephones, respectively, because these were accessible to all students. However, as Kutlo commented: "It is surprising to find that learners are able to access complex online media for personal consumption but are not accessing online materials to learn". Learning Management Systems were available when distance learners came on campus for their residential sessions but, of course, distance education learners did not access online materials, since they had even less experience with online learning technologies than f2f students. Lecturers generally concluded that distance education learners, like f2f students, preferred handouts.

It is worth mentioning that participants expressed a number of concerns around distance education. 1) They felt that although distance education learners were supposed to learn independently using the module, most of them did not. For instance, Oratile commented, "… because we expect independent learning from distance education learners, we are facilitators, guiders, and/or tutors, not lecturers". But in practice, lecturers found that when distance education learners came for their residential sessions these learners had not covered the material on their own. Instead, lecturers had to teach all the modules in that one week. 2) Participants mentioned that distance learners often did not have high school qualifications and consequently were ill prepared to learn on their own. 3) A third factor was that many distance learners struggled with English language proficiency. These three factors also contributed to the fact that distance learners did not access online materials. For instance, Mpho said that when he taught distance education learners his method of teaching changed to focusing on the completion of the syllabus, thus he adjusted the material covered and provided distance education learners with more printed handouts instead of asking them to access the material online.

Yet ultimately participants stated that they believed the University of Botswana should offer fully online programs to distance learners although not many of them could see how this would be possible with the lack of computer/online readiness among students, the lack of access to computers, slow or non-existent networks or electricity cut-outs.

Participants were different in their use of technology. The technologies they used varied based on their characteristics, knowledge, skills and beliefs but all were identified as early adopters. All

participants believed in the value of technology one way or another but believed that the University of Botswana had a long way to go to transition from f2f to online learning. Their views concurs with Masalela's (2011) study conducted at the University of Botswana which found that this transition should be done gradually, that the University of Botswana should make sure lecturers are comfortable on using online learning technology and that lecturers and students need comprehensive training on how to use online learning technologies.

What are the Challenges Faced by these Early Adopters

The challenges reported by participants are presented here based on Rogers' (2003) three concepts of compatibility of technology, social systems, and early adopters.

Compatibility of Technology

As has been mentioned, although participants believe technology facilitates the teaching and learning process, they reported that even though online technology was available, it was little used by students and difficult to use by lecturers. Therefore, it was more compatible to use PowerPoint. According to Rogers' (2003) the adoption and diffusion rate of technology increases when it is compatible to the values, needs, beliefs, and experiences of early adopters. Online technology is not compatible for the following reasons: Lack of infrastructure for students, lack of general technology use and lack of time to develop technology proficiency.

Lack of Technology Infrastructure for Students: This has been mentioned before but it remains a substantial problem. In a context where there is intermittent electricity and little networked internet infrastructure, it is very difficult to set up online learning that is sustainable. Dial-up internet connection, the most common kind of connection where it is available, is expensive and beyond the affordability of most students, especially distance education students who are characteristically the poorest. There was consensus from participants that lack of resources affected technology use. As Lesego reported, on the electricity outages in the country:

> *The reality is Botswana as a country is still behind when it comes to the learning technologies because there is a problem with network connections in remote rural areas and even in the towns and cities we still feel it. Therefore, the distance education program is still going to run like when it started as a print-based program and now is using a module blended with f2f classroom teaching to facilitate their learning during the residential sessions on campus. It started with distance education in 1982 and it is still the same. The only difference is we are exposed to online technologies, which are impossible to use. No matter how committed or active early adopters are, functioning within an environment such as this poses significant problems.*

Lack of technology use: Clearly both f2f students and distance education learners were not using the available online technology. Distance education learners, during residential sessions on campus, did not access online materials posted through Blackboard. Face-to-face students did not access their regular classroom materials online despite ongoing encouragement by lecturers. A more compatible technology currently is the use of cellphones. However, it is costly for f2f students and distance education learners to connect to the internet via their cellphones, as was noted by Serero, Lesego, and Itumeleng.

Some f2f students did own laptop computers but these were very small in number. Many cannot afford to own laptops. The university does provide students with access to computers via computer labs but again, students did not make use of these for online learning technologies.

Participants believe that for the use of technology and online learning to be successful f2f students and distance education learners should be using it; otherwise, the use of technology in the system will fail, as is the case now based on this study's reports. Therefore, lack of technology use by f2f students and distance education learners' impacts negatively on participants' use of technology.

Lack of Time to Develop Technology Proficiency: Participants in this study commonly viewed time as having a major impact on the adoption and diffusion of technology in teaching and learning when transitioning from f2f to online learning. The lecturers' views concur with Rogers' (2003) concept of the time aspect, that it was strength as far as innovation diffusion is concerned. The participants as such felt that the preparation of online course components was time consuming. Many mentioned that their workload increased when they engaged with online learning. Lorato, for example, stated that in online learning a lecturer need to respond to each individual student. Whereas in f2f classroom, lecturers could respond to all students at the same time.

Participants were also concerned about time to learn how to use online technologies. One participant, Serero, commented:

> *There is no time to even practice what we learn through Centre for Academic Development, apply it to f2f or online learning, as we always get stuck in front of learners. We should be allowed time to practice this on our computers but we end up using online technologies in the classroom for both f2f students and distance education learners.*

Concerning time, Mmapula said,

> *When the short break comes in the month of May/June for face-to-face students, the distance education learners come for their residential sessions, and at the same time Centre for Academic Development offers training and workshops on use of technology, when is our time to rest?*

Lecturers said that they were allocated a limited time to teach the syllabus, which put enormous pressure on their f2f classes. In addition, they were required to teach distance learners during their residential sessions and as previously noted, had to teach the whole syllabus when they should only be revising. To also attend training workshops to implement new technologies or methods of teaching was almost impossible. There were also timetable clashes where teaching times overlapped with training schedules. Participants said that using online learning technologies was difficult because time was not allocated for them to learn and practice using online media and thus they viewed online learning as a challenge. For instance, Serero captured other participants' views by remarking: "For instance, we are told that workshops/training are available for free to attend on how to use technology for teaching and learning, which at times clashes with our class schedules and free times". There were also many logistical problems: scheduling of training without venues; sending timetables out at the last minute to lecturers; and scheduling weekend training without considering lecturers' personal time.

According to Rogers (2003) time is ignored in most behavioral research. He argues that it is very important to think about time in diffusion research. He suggests that an individual's decision to adopt, and the rate of adoption necessarily includes time dimensions. Like Rogers, participants believed that it takes time to learn and adjust to changes in transitioning from face-to-face to

online learning. Therefore, time is a very important concept that affects the transition process to online learning.

The Social System

According to Rogers (2003) a social system is an environment within which an individual operates. The organization in this context refers to the University of Botswana in which the participants acted as early adopters of technology innovations and diffusion. Rogers argues that individuals are governed by the boundaries of the social system. Similarly, the participants in this study were governed by the University of Botswana administration and environment. Participants felt that online learning at the University of Botswana was driven by a top-down approach, where mandates were imposed without involving the people who were going to implement the online learning policies. Lesego's comments capture the essence of this point: "You know, when I arrived from abroad upon completion of my PhD program, I was just told and instructed by the University of Botswana administration that you go and teach f2f and also distance education programs".

Top-Down Approach: Participants as experts in their fields, generally believed that the University of Botswana imposed policies without initially involving them. Participants felt that the University of Botswana did not include them as planning members when new technology innovations were introduced in the system. They remarked that instructions were imposed through the system by issuing mandates. Serero noted: "University of Botswana is imposing policies on us like teaching distance education courses and the use of technology without involving us in the initial stages of planning". Lecturers noted that although they were pressured by administration and policies at the University of Botswana, this did not mean that they could also force students to use online media. Participants in this study were concerned about their lack of proper involvement in the implementation of online learning. They felt that with consultation and better communication to ensure their acceptance of the adoption and diffusion of technology innovation, they might be able to compel students to use online learning.

Early Adopters - Lecturers' Emotions

Participants showed some unexpected emotions as I was recording their responses from the in-depth interviews. Reporting on these emotions of lecturers was unexpected data. I have included this discussion on the emotions here as an additional way to understand the participants' teaching experiences, beliefs, behavior with technology. Participants shared their grievances, anger, and unhappiness with online learning. Several emotions emerged from participants in this research study.

Participants generally felt that they were not given enough support to adopt and diffuse the technology into the system. Serero said rushing them to implement technologies in pedagogies caused her to fear and resist using online media. The issue of lack of support needs some clarification. The university provided support in terms of professional development and training. However, many participants felt that they could not participate in the training or that the training did not provide them with the support they needed to implement their learning. Keitumetse provided a useful example here: Keitumetse said that he attended about fifteen short courses on teaching and online technologies. He was also trained on each of the Learning Management Systems such as WebCT, Blackboard, and Moodle, and how to use videos in teaching and learning. After these courses, offered by the Centre for Academic Development, he requested a course shell to prepare a course for online purposes by adding modules and notes for f2f

students and distance education learners to access as and when the need arises. Keitumetse said that lecturers had to take their own initiative. He said: "They [the university] will just invite interested lecturers to attend [training] if they have time and if they are interested". His point here is that the training is voluntary while the implementation of online learning is mandatory. Although training was available, participants indicated that it was hard to attend. For instance Kutlo's commented:

> *At University of Botswana there is the mainstreaming distance education policy that actually outlines the responsibilities for all stakeholders but no one cares because Centre for Continuing Education, they are concerned with the administrative aspect of adult education and we are concerned with the academic aspect and in terms of working together to deliver the distance education programs sometimes it's a problem. I presented a paper one time at Botswana College of Distance and Open Learning about the arrangement of distance education at University of Botswana and I outlined some of the problems where we find that a lot of things do not work for distance education.*

Another participant, Lesego, said:
> *… I am interested in the students and I don't want them to get a raw deal. I want them to get what's best from their lecturer and I cannot fight for another department, you know what I mean. So issues or problems at Centre for Continuing Education are not my baby, you see what I mean, because that's a program where you are labeled for teaching but the program belongs to somebody else.*

The lecturers noted that they had been sent abroad for further studies, and when they came back, the University of Botswana expected them to implement policies by teaching programs as specified without having been guided and involved in the initial plans:

> *You just go for training abroad and when you come back you are told that we have a crisis here as we need someone to teach this. Here is the module, please teach, and that's the end of it. Students come and register and they have been told that your lecturer is so and so. When they get here they expect you to teach them and they don't even understand their program themselves. That's why I am saying it is part of the job. You are hired as a lecturer in the university and you are expected to go and teach (Lesego).*

Furthermore, she said that the Department of Distance Education Unit at the Centre for Continuing Education is the coordinator from the administrative side. They were responsible for overseeing the distance education programs by hiring tutors, module writers and managing the distance education program:

> *… this is how they put it: we have an Adult Education program by distance mode, and it is expected that you guys who are teaching the full-time program you also teach here because this is your area, just like Business, just like Primary Education, just like Law, just like Social Work, that is how it is done. (Lesego).*

The lecturer said that things are not in place, and the coordination is not properly carried out by the administration Department of Distance Education Unit/Centre for Continuing Education:

> *… surely even when it comes to resources the full-time students are better off than those ones, because even your own employment. I was hired to come and teach f2f students, not the distance. So for me really, most of these problems whether they are administrative or structural, or whatever, most of it needs to be addressed. I don't know but for me I just feel that they just have to come back to the department. Experts, from*

the Department of Distance Education Unit in the Centre for Continuation of Education should come do the administration here in the Department of Adult Education, Faculty of Education. Then they will have ownership (Lesego).

Lesego argues that the university needs to hire more people:

People who are not even distance education or adult education [experts], precisely because of that. When I was hired I was applying to be a full-time lecturer and to teach full-time students, …but if you are going to engage me on weekends then this is extra work. Then they will say ok now you are talking of appreciation, which is 70 Botswana pula (currency) per course.

Some participants wanted to be teaching distance education learners in addition to their normal f2f teaching. Others were against this. Some lecturers found it unfair because the workload is extensive for distance learning. For example, Lorato said, "Since it is a voluntary type of thing, I find the reward as an appreciation kind of thing". Lesego further argued that there was a reaction to overworking lecturers: "That is why we got to a point where colleagues were saying … I am not going to teach, that is why they are nowadays sourcing from outside".

What Lesego means here is that the University of Botswana hires tutors from other institutions instead of from within the Department of Adult Education. The participants believed that if tutors are hired from outside their Department of Adult Education, they should be involved in the hiring process because they do not want their program to be run by unqualified tutors.

The main reasons for these emotional responses seem to be overwork and a lack of involvement in the decision-making. Many felt helpless, and pressured through a top-down approach to do their work, which they believe affects the success of online learning. According to Rogers (2003) the organization should work together towards a common goal because if one section fails in the adoption and diffusion of technology innovation will not be spread, hence the rate of adoption per individual varies. Similarly, although from a distance education concept with regard to the use of technology, key thinkers in distance education argue that distance education is complex and there is a need to look at it from a systems approach (Moore & Kearsely, 2012; Saba, 2013). What they are saying is that distance education and online learning has components with activities working together and within which are subsystems and sub-subsystems; therefore, if one of the components within the system has problems it has an impact on all other components in the system.

The main conclusions for this section are identified and are discussed below. These include: 1) the social system, while providing resources, is constraining; 2) early adopters face constraints within a top-down social system; and (3) online technologies are used in the f2f classroom but not online.

The social system: while providing resources, is constraining. Although the University of Botswana through Centre for Academic Development provided professional development and training to lecturers for online learning, lecturers believed the training was not adequate enough to sustain a transfer of learning to implementation. In addition, training was voluntary and there were scheduling issues, which prevented participants from attending. Participants also felt overworked and overloaded and did not have time to participate in training. While computers and online facilities were available to students, few made use of them.

Early adopters face constraints in a top-down system: Participants felt that online learning at the University of Botswana was policy-driven from the top-down. They felt this was harmful because their opinions were not taken into account and they were the ones implementing online learning. They felt that they were not involved in decision-making and were left out of the process. A

consequence of this top-down approach is that even though all participants felt that online learning was important and necessary, they tended to use technologies (like PowerPoint presentations) most often because this was more compatible with the conditions under which they taught.

Use of online technologies in the face-to-face classroom: Online learning for distance education does not exist despite overt intentions by the University. This is due, mostly, to larger infrastructural problems. Surprisingly, the most use of online technology is in the f2f classroom. While the use of online technologies in f2f classrooms is still low, diffusion of technology is happening. This is mostly due to the early adopters in this study and others like them at the university. Although the university has made considerable attempts to enable the adoption of learning technologies, the constraints are enormous. Consequently, the use of online technologies in the f2f classrooms is a step in the right direction.

This section reports on the results of the interview data and uses the two questions as a way to structure the results. The first question was on the characteristics of early adopters, particularly their knowledge, skills, and beliefs. Rogers views early adopters as innovators, leaders, and localites who, can also be change agents. It was found in the study that participants had all these characteristics, as noted by Rogers. However, the study showed that participants were constrained by the social system and could not fully apply themselves based on their characteristics. In addition, participants had knowledge in online learning technologies through training but were unable to transfer that learning into practical skills in a sustained way because of a lack of time.

The second question was about the challenges faced by participants, which were grouped under Rogers' (2003) three concepts. Firstly, Rogers argues that when the compatibility of technology is high the rate of adoption is high. What this study shows is that there is little compatibility with online learning technologies. Secondly, the social system operates based on its structures that guide the individual adopters of technology (Rogers, 2003). Participants reported that University of Botswana has a top-down approach to technology adoption, which, they feel, hinders the diffusion process. Thirdly, from the perspectives of early adopters, Rogers argues that the individual early adopters influence peers as potential adopters. Early adopters, in this study, did influence their peers. Throughout the interviews, emotions emerged as a further theme. Participants indicated that they felt overworked and overloaded. In sum, they were not happy with the system. This is important because if these early adopters feel disloyal to the system, they are less likely to promote the diffusion of technology.

This section has shown that although there is little online technology diffusion happening at the University of Botswana, Department of Adult Education, early adopters are able to generate pockets of diffusion albeit within enormous constraints.

DISCUSSIONS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

The purpose of this paper is to explore educational technology adopters and integration experiences of technology at the University of Botswana. The research design employed was a qualitative case study approach, which collected data on the experiences of technology among early adopters. For the purpose of exploring and understanding technology diffusion, participants were purposefully selected from the Department of Adult Education, Faculty of Education, at the University of Botswana. The Department of Adult Education is a key department for the

implementation of both national and university policies and is involved in teaching f2f courses and distance education. Hopes of rolling out online learning and achieving widespread education access lie within this department. Semi-structured interviews were the major source of data for this study, as were observations of f2f classroom teaching. Secondary documents and artifacts were also used as sources of data.   Rogers' (2003) DoI theory was used as a conceptual framework to analyze the micro and macro perspectives of technology diffusion. Specifically, Rogers' three main concepts— compatibility of technology, social systems, and early adopters— were used as a guide to understand how participants' experiences with technology influenced the transition process. It was important to mention the national educational policy environment since this provides the impetus for much of the drive for online learning by institutions, such as the University of Botswana, in the country.

In the aforementioned section, the two research sub-questions were used to analyze participants' responses in the interviews. The purpose of preceding section was, therefore, to discuss what the participants thought about moving to online learning. The three conclusions found that participant responses to the research questions were:

1.   The social system, while providing considerable resources, was constraining
2.   Early adopters faced substantial constraints within a top-down social system
3.   Lecturers mostly used technology that was compatible to their context

The first part of this section discusses responses to the two questions about their perceptions on educational technology and integration for teaching and learning in the university context. The second part states the implications, and evaluates the study.   The final part presents recommendations for future research and conclusions for the section.

Key findings from the study

The three overall conclusions were derived from the findings of this study:

1.   Little online technology is being diffused.
2.   The top-down technology adoption approach of the University of Botswana has contributed to an environment that promotes minimal technology diffusion and supports technology use that is compatible to existing conditions.
3.   Any diffusion of online technologies that is taking place occurs in the f2f classroom.

Each of these findings will be discussed in turn in the following sections.

Little online Technology is being diffused

In the Department of Adult Education, based on the results of this study, participants used very little technology outside the f2f classroom. Even in the f2f classroom, while some online technologies were being used, these relied on specific lecturers championing online learning technologies. No online technologies were being used in distance education. Distance education remains print-based. Even during residential sessions on campus, students did not use the online facilities. Consequently, there is no transition from f2f to distance online technologies.

The main reason for this appears to be infrastructure challenges. According to Rogers (1995, 2003) when an individual has knowledge about technology, for instance, they form an attitude toward the innovation. If the attitude is positive and compatible then the adoption and diffusion of technology innovation follows a somewhat linear direction. Early adopters innovate with the

technology and encourage late adopters to use the technology. In this way, late adopters more easily adopt it. However, in contexts like Botswana, the linear flow of technology adoption is halted because of a very basic lack of resources. This issue is also confirmed in the research literature. Research from universities in Sub-Saharan Africa showed that the major impeding factor to technology diffusion is the huge gap between urban and rural regions in terms of access to ICTs (Farrell & Isaac, 2007). One of the major drawbacks is intermittent electricity. Another is the lack of internet connectivity for the general public. Sebusang, Maruping, and Chumai (2005) in Botswana revealed that broadband access was not within the reach of the population at large. The study also showed that a lack of connectivity was not the only problem, knowledge, skills, and experiences of using technology were also lacking. These points are further confirmed by other research on online distance education in southern Africa (Farrell, & Isaacs, 2007; Farrell, Isaacs, & Trucano, 2007; Opati, 2013). My study confirms these findings, because distance education learners are generally located in remote rural areas, where network connections are lacking and accessing online materials was not possible.

The Botswana Vision 2016 emphasized the importance that all urban and rural areas be networked and connected to facilitate accessibility to information for the future knowledge society. This has not been implemented. There is no doubt that the University of Botswana was following its policy mandates and that online technology was available to all lecturers and students. Learning Management Systems are available and a range of training options were delivered regularly. However, even though technology is accessible on campus both f2f students and distance education learners still did not use it. The findings concur with the literature that, in some contexts, technology can be available and still not accessed. This means that even if the system is well resourced with a rich technology infrastructure it does not necessarily mean that individual adopters will be able to easily access the available technology (Kyakulumbye, Olobo, & Kisenyi, 2013). The study showed that if students, particularly, are not able to access technology, academic staff, even if they are early adopters, will not be able to apply the use of technology in the system even though it may be available and accessible to them.

Other studies confirm this point and showed that when lecturers and students use of technology is lacking, it hinders and or slows down technology use in teaching and learning, and instead other technologies are used, mostly to transfer information in f2f contexts, as I found in this study (Opati, (2013). For instance, Moghaddam, (2017) findings reveal that, "teachers generally use ICTs to transfer the content to the students" (p. 1). Similarly, Gyamfi (2015) in a Ghanaian university found that slow internet connectivity and a lack of internet access hindered the effectiveness of the blended learning environment for lecturers and students. In addition, Kyakulumbye, Olobo, & Kisenyi, 2013 found that ICT infrastructure had a strong relationship on ICT utilization at the Ugandan Christian University. The findings of this study concur with the literature that states that where there is lack of infrastructure this leads to barriers to technology diffusion (Krishnakumar & Kumar, 2011). In addition, Chigona & Chigona, (2010) concluded in their findings that insufficient equipment were factors affecting the integration of ICT in teaching and learning.

Compatible Technologies are being used

The findings concur with Rogers' (2003) views on compatibility and other studies on higher education from the context of African and Western universities that indicated that when compatibility is high the adoption and diffusion rate of technology innovation increases (Jacobsen, 1998; Kesee & Shepard, 2011; Masalela, 2009; Samarawickrema & Stacey, 2007). The findings from this study show that, for participants, online learning technologies are not compatible with the existing context. Even though participants believe that online learning is important and useful to teaching and learning, they do not believe it is possible with the current infrastructure and other

challenges. On this note, this study showed that students did not recognize the value of online space; rather, they preferred the physical f2f classroom, where the lecturers mostly teach by providing information to them and supplementing their f2f classroom teaching with PowerPoint presentations and printed handouts.

Participants believed that the students did not use technology because of the low levels of technology use among students generally. This issue is confirmed by other studies. For example, in a Ghanaian university context, Asunka (2008) argues that students perceived online learning as complex, and demanding and time consuming. It is possible that students in the Botswana context have similar experiences. This also concurs with Rogers' (2003) views that it takes time to adopt and diffuse technology, thus students' needs time and assistance to learn to use technology. They do not do so voluntarily especially within contexts where there is not a culture of technology use. Lecturers, then, used the technologies that best suited their contexts and current experiences. In this case, the most often used technology was PowerPoint. Since lecturers were under extreme pressure to complete syllabi within the semester, they resorted to teacher-centered lecturing using PowerPoint presentations. This was most compatible with participants' circumstances.

Participants were selected because they were involved in the diffusion of technology. They were identified as early adopters because of their use of online technologies, and because they taught both f2f and distance education. Why, then, were participants using PowerPoint more than the online technologies? Participants generally believed in the value of online learning. De Gagne and Walters (2009), Marcy (2007) show that faculty generally do transition from traditional f2f classroom teaching to online, and transfer their f2f experiences into the online learning environment. However, this has not been the case in this study. From the data, it is clear that the top-down approach to policy implementation provided a major barrier to technology diffusion. This concurs with the literature (Masalela, 2011; Thomas, 2008). For example, Masalela (2011) argues that lecturers were not involved in planning but only at the implementation stages and were rather felt the system is forcing them to use technology without allowing them time to learn and practice using it. Masalela (2011) and Thomas (2008) also noted that the University of Botswana did not communicate the initial stages of technology innovation decision-making to lecturers.

According to Rogers (1995) the organization as a social system involves all individuals for a common goal; otherwise, the technology innovation rate decreases. Studies conducted in Africa, Europe, North America, and Australia have similar reports of universities operating through a top-down approach, which impacts on the adoption and diffusion of technology use by lecturers (Masalela, 2011; Noble, 1998; Surry, 1997; Thomas, 2008; Uys, 2001). The top-down constraints on lecturers using technology in transitioning from f2f to online learning have been a topic of much research (Jetnikoff, 2015; Masalela, 2011; Opati, 2013; Vajargah, Jahani, & Azadmanesh, 2010).

At the University of Botswana, these participants believe in online learning but due to the challenges they were faced with in their environment and the context in which they operate, they were compelled to be more inclined to use technologies that were easier and would help them to achieve their goals in this context. Diffusion depends on the culture, context and situation, which in the end lead to compatible technology use. In the case of this study, technology use by participants concurs with Rogers (2003) views on the concept of compatibility of technology. This lack of compatibility for online learning technologies in contexts similar to Botswana has been confirmed in many other studies (Buabeng-Adoh, 2012; Sahin, 2006).

From Rogers' (2003) perspective, a change agent (such as an early adopter) does not operate in isolation; rather, he/she operates from a micro to macro level based on prior experiences which

impact on the social change, the organization, individual adopters and the technology being diffused. The point is the structures of the social system form a context within which the individual operates. Within this context, any technology innovation must be planned, organized and clearly communicated to the opinion leaders, who in this case are the participants, if the innovation is to be diffused (Jacobsen, 1998; Samarawickrema & Stacey, 2007).

Participants reported that there was lack of support because they were not allowed time to learn and practice the use of technology. A policy-driven top-down approach to technology adoption is characterized by a lack of support, leading to impacts on time management, and pressurized to complete the syllabuses within a semester. Instead, the system pressured them to complete the syllabuses without even considering the level of understanding of f2f students and distance education learners. The findings concur with other studies in African higher institutions of learning on the lack of support felt by lecturers in universities (Agbonlahor, 2006; Masalela, 2011; Thomas, 2008; Totolo, 2007), which negatively impacts on the adoption and diffusion of technology. Rogers (2003) argued that the concept of time is an important consideration because individual adoption of technology is based on time.

Briefly, the main conclusion in this section was that participants felt they were being driven by a top-down policy approach of technology adoption, which contributed to the lack of support by not allowing them enough time to learn to use technology in teaching and learning, and pressuring them to complete syllabi. This also concurs with the literature from the Western world (Surry, 1997). For instance, developer-based theorists focus on organizations making changes, which contrasts with the adopter-based theories, which are focused more on the interpersonal aspects of the innovation diffusion from a bottom-up approach (Surry, 1997). In other words, the communication level is more effective from the bottom-up instead of top to bottom as this means individual adopters are compelled to implement innovations. In addition, Noble (1998) from the context of the University of York in Toronto, Canada, found in his study that lecturers/professors went on strike because they were being forced to adopt web-based learning and also students said that they did not pay for cyber learning.

Diffusion of Technology in F2F Classrooms

Despite the lack of diffusion of online technologies to distance education, this study has shown that technology diffusion is taking place within f2f classrooms. It is in the f2f classroom that these early adopters were engaging with online Learning Management Systems, social media and various Web 2.0 technologies. There were pressures on the participants that led them to teacher-centered approaches to teaching, even though they were aware of, and wanted to engage in, student-centered modes of teaching. Yet, they still engaged in online media to some extent – some more than others. Many of the participants believed that online technologies would ultimately encourage more student-centered approaches. This is a point that is confirmed in the research literature. Stacey and Wiesenberg (2007) found that "majority of their participants admitted being more teacher-centered in the f2f mode and more learner centered in online teaching" (p. 36). Despite the pressures on completing syllabi on time (which led to teacher-centered approaches), the lack of uptake on online technologies by students, the inability to make the most useful use of the training available, the frustration with the university administration and the general feel of being overworked, these participants still used online technologies in their classrooms. Some felt forced to do so (Masalela, 2011; Noble, 1998, Thomas, 2008) because of the inevitability of technology (Surry, 1997), but most others did so because they believed in the value of technology (Mufeti, Mbale, & Suresh, 2011; Stacey & Wiesenberg, 2007).

In this way, some of the early adopters in this study can be seen as change agents. However small their use of technology, they were still using the technology and influencing others around them. Currently there is little student uptake, but over time the potential for uptake could change. They may not drive change at the pace expected in more developed countries but their continual use of the technology will ensure that the technology-use continues to be spread throughout the system. According to Rogers (2003) change agents are leaders who initiate, instruct and/or influence those in the system to implement change: "A change agent is an individual who influences clients' innovation decisions in a direction deemed desirable by a change agency" (p. 312). Change agents initiate change by using an innovative technology and encouraging its adoption within the social system, which impacts on the rate of adoption (Ellsworth, 2000; Jacobsen, 1998; Less, 2003). Less (2003) has argued that change agents usually occupy positions of power such as senior administration or university presidents. Yet other literature has noted that change agents are any individuals involved in making changes in the organization (Jacobsen, 1998; Hall & Hord, 1987, 2014; Hall & Loucks, 1979).

There is no doubt that these participants, as change agents, face major challenges. They found they were not able to apply their leadership skills, which as noted by Rogers (2003) is necessary. Participants felt they could not influence the university administration because of the top-down approach taken by the University of Botswana.

Implications of Theory and Practice

This study confirms what other studies in similar contexts have found: that technology innovation and diffusion is severely hampered by lack of infrastructure, poor resources and a technology-weak cultural base. A top-down approach to policy implementation at the university has provided further obstacles and the contextual environment of overwork, lack of time, poor student uptake and administration issues has impeded the diffusion of online technologies to distance education at the University of Botswana. These hindrances to the adoption and diffusion of technology at the University of Botswana experienced by lecturers in the Department of Adult Education are similar to those that have been found by researchers in other university contexts such as in the UK, US, Canada, Australia, New Zealand, Nigeria, and South Africa (Buabeng-Adoh, 2012; Chiasson, Terras, & Smart, 2013; Chigona & Chigona, 2010; De Gagne & Walters, 2009; Johnson, 2008; Masalela, 2006). Yet, what this study also shows and can contribute to the debates is that technology diffusion is happening in f2f classrooms. Rogers' framework has been significant in allowing an analysis of technology diffusion in this context that would not have been possible otherwise, however, not all technology diffusion takes place along linear paths. Perhaps in Botswana, technology innovation needs to grow in the f2f classroom first. Researchers from US and Australian university contexts argue that moving to online technologies is an individual journey, which takes time because of contextual differences (Chiasson, Terras, & Smart, 2013; Macy, 2007; Redmond, 2011).

The implications for practice are that technology diffusion in f2f classrooms need to be encouraged and as other researchers have suggested, strategies should be put in place to alleviate the problems identified in this study (Masalela, 2011; Thomas, 2008; Jacobsen, 1998; Oladokun & Aina, 2011).

This study has implications for Botswana's national policies, which have emphasized that everyone has the right to education and education should be available and accessible to educate the nation for a more knowledgeable society (Revised National Policy on Education, 1994; Vision 2016, 1997). The Botswana government invested significantly in information technology with its infrastructure to be used in Botswana's education systems.

Limitations of the Study

There are two key limitations to this study: 1). Scope of the study was limited to the Department of Adult Education. It is impossible to generalize from one unit and apply the findings of this study across the university. Additional research on other units would help to confirm or add to the results of this study. 2) The limited number of participants in the sample. The population pool used for the current study was a small membership of a unit rather than the total faculty population. The lecturers chosen for the study were based on their position as instructors who used technology. Extending the sample to other lecturers who do not use technology could provide with insights as to why they are not innovating with technology. In other words, a broad survey of university academic teaching staff would yield useful data. Despite these limitations, the advantage of the small sample size was the depth of experience and perceptions gained from the participants.

Recommendations

The following recommendations are offered:
1. Online technologies in f2f classrooms should be facilitated and encouraged.
2. Online technologies should be promoted among students and students should receive training.
3. Lecturers should be included in decision-making involving technology. As a closing remark, there is need to develop policies in context because they facilitate the development and guidance of systems such as education in Botswana, but there is need to involve the end users as early adopters and implementers of these policies as they are the major change agents in social systems such as organizations like the University of Botswana.
4. Professional development and training for lecturers should be supported while taking time management into consideration.
5. The University of Botswana and Faculty of Education, Department of Adult Education with the Department of Distance Education Unit in the Center of Continuing Education should work out the planning and management of the programs and courses for smooth professional coordination that also sets the ownership of programs clearly.
6. The university should make sure that equipment and resources are available and repaired on time for the smooth continuation of the programs.

Future Research

The study was conducted by focusing on a small sample that was purposively selected specifically to understand the transition from f2f to distance education to online learning at the University of Botswana in the Department of Adult Education. Therefore, the following are areas to be researched as a continuation of this study:

1. Research students' use of technology in all faculties and departments
2. Compare with Department of Distance Education Unit/Centre for Continuing Education at the University of Botswana, college of distance and open learning in Botswana is dedicated to online technology as the first open and distance learning university in Botswana
3. The quantitative aspect is to capture more areas to be generalized, such as faculties, administrators, and government departments, and the qualitative aspect is to interview for the purpose of understanding.

Conclusions

The purpose of this study was to explore the experiences of participants identified as early adopters of technology innovation in the transition from teaching f2f to distance education to online learning. The study discussed the environment in which participants worked as lecturers, their experiences in teaching and technology, their beliefs about online technologies and online learning. Based on this, three overall original conclusions were found:

1. Very little technology was used outside the face-to-face classroom.
2. The top-down technology adoption approach at the University of Botswana contributed to an environment that promoted minimal technology use and supported compatible technology use.
3. Where participants did use online technologies, it was in the f2f classroom.

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